

34° at Montgomery; West Gulf States, 19° at Galveston to 47° at Uvalde, Tex.; Ohio valley and Tennessee 31° at Cairo to 38° at Memphis; Lower Lake region, 23° at Oswego to 35° at Buffalo; Upper Lake region, 25° at Chicago to 39° at Marquette; Upper Mississippi valley, 28° at Keokuk to 39° at St. Paul; Missouri valley, 33° at Omaha to 47° at Yankton; Red River of the North, 38° at Pembina to 43° at Breckenridge; Eastern Rocky Mountain slope, 36° at Deadwood and 39° at Fort Sill to 50° at North Platte; Rocky mountains, 17° on Pike's Peak and 31° at Virginia City to 45° at Cheyenne; Western Plateau, 32° at Pioche to 40° at Winnemucca and Boise City; California, 24° at San Francisco to 56° at Campo; Arizona, 55° at Yuma to 58° at Tucson; Oregon, 29° at Portland and 31° at Roseburg; Washington Territory, 27° at Olympia.

*Frost*, injurious to vegetation, is reported as follows: Green Springs, Ala., 5th, peaches killed, and the foliage of many trees frost bitten. A report, dated the 18th, gives the following information: Burke Co., Ga., peaches nearly all killed; Talbot Co., Ga., peaches one-half killed; Sumter Co., Ga., fruit materially injured; Montezuma Co., Ga., crops not materially damaged by late frost; Rockdale Co., Ga., young corn killed; Thomas Co., Ga., corn injured; Valdesta Co., Ga., considerable damage to cotton and other vegetables. Houston, Fla., 5th, great damage to vegetables and early cotton; Mayport, Fla., 5th, 6th, vegetation considerably injured; Gulf Hammock, Fla., 5th, 6th, cotton so severely damaged that it had to be replanted; corn and sugar cane damaged somewhat; Thomasville, Ga., 5th, vegetation considerably damaged; Peoria, Ill., 3rd, many flowers killed; Independence, Kan., 2nd, 3rd, 4th, peaches all killed; Creswell, Kan., 18th, fruit badly injured; Lenoir, N. C., 9th, peaches killed; Aiken, S. C., 4th, 5th, fruit injured, pea blossoms and leaves of trees killed; McMinnville, Tenn., 3rd, 4th, 5th, early fruit considerably injured; Boise City, Idaho, 26th, all kinds of fruit frost-bitten; St. Marks, Fla., 6th, considerable injury to corn, cotton and tender vegetation; Mobile, Ala., 5th, potatoes and beans severely injured; Knoxville, Tenn., all fruits supposed to be killed in this vicinity; Cairo, Ill., peaches reported entirely destroyed; Nashville, Tenn., 4th, peaches killed; Chattanooga, Tenn., 5th, fruit injured; Charlotte, N. C., 4th, 5th, vegetables and fruit all destroyed, wheat and oats badly damaged; Wilmington, N. C., 4th, great damage to early vegetables and fruit; Augusta, Ga., 4th, fruit and vegetables seriously injured; Lynchburg, Va., 4th, fruit slightly injured; Yreka, Cal., 7th, 20th, heavy frost, peaches killed; Great Bend, Kan., 3rd, peaches damaged.

*Frost out of Ground*.—Muscatine, Ia., 1st; Monticello, Ia., 1st; Waltham, Mass., 16th; Contoocookville, N. H., 15th; Hector, N. Y., 14th.

*Ice* formed at Salt Lake City on the 9th; Santa Fe, N. M., 9th, 10th, 13th, 23rd, and in the Southern States as follows: Forsyth, Ga., 4th, 5th; Weldon, N. C., 4th, 13th; Wilmington, N. C., 4th; Statesville, N. C., 4th; McMinnville, Tenn., 3rd, 4th, 5th; Cairo, Ill., 3rd, 4th, 5th; Charlotte, N. C., 4th, 5th; Cape Lookout, N. C., 4th; Augusta, Ga., 4th; Green Springs, Ala., 3rd, 4th, 5th, 6th; Gulf Hammock, Fla., 5th; Palermo, N. Y., 4th, ice on pond 16 inches thick; Strafford, Vt., 29th, streams clear of ice; Dunbarton, N. H., 30th, ice still on ponds; Rowe, Mass., 30th, ice completely covers a reservoir pond except about the edges where streams flow in, although it is fully open to the sun; it is said to be very rare for it to be found clear of ice before May 1st.

*Ground Frozen*.—Atco, N. J., 20th; Palermo, N. Y., 4th; Egypt, Pa., 18th; Chambersburg, Pa., 12th; Mt. Solon, Va., 3rd; Neillsville, Wis., 2nd, from 3½ to 5 feet deep.

## PRECIPITATION.

The general distribution of the rain-fall, which includes melted snow, for the month is illustrated as accurately as possible upon chart No. III. In the lower left-hand corner of same will be found a table giving the average precipitation of *April* by districts. In New England, the South Atlantic and Gulf States it has been larger than usual. Along the California coast an average fall has taken place. In the remaining districts there has been a deficiency.

*Special Heavy Rains*.—13th and 14th, Okalooska, La., 3.20 in. 14th and 15th, Mobile, Ala., 3.33 in.; Fort Barrancas, Fla., 5.40 in.; St. Marks, 5.15 in. 15th, Shreveport, 4.64 in. in 8 hours. 15th and 16th, Brook Haven, Miss., 3.15 in. 15th to 17th, Thomasville, Ga., 5.54 in. 16th, Okalooska, La., 2.60 in.; New Orleans, 2.82; Aiken, S. C., 3.60 in.; Montgomery, Ala., 2.52. 16th and 17th, Savannah, Ga., 6.11; Charleston, S. C., 5.09; Wilmington, N. C., 2.61 in.; Forsyth, Ga., 3.65 in.; Quitman, Ga., 3.90; Fayetteville, N. C., 3.00 in. 16th to 18th, Fort Barrancas, Fla., 4.08 in. 21st and 22nd, Wellington, Kan., 3.13 in.; Ft. Sill, Ind. Ty., 6.46 in.; Graham, Tex., 3.68 in., (supposed total about 4.03 in.) 21st to 23rd, Hat Creek, Wy., 6.74 in. 22nd, Corsicana, Tex., 6.31 in. (in 4 hours); Melissa, Tex., 4.00 in. 22nd and 23rd, Clarksville, Tex., 5.50 in.; Austin, Tex., 4.40 in. 23rd, Corsicana, Tex., 3.31 in. 23rd and 24th, New Ulm, Tex., 5.12 in. 25th and 26th, New Orleans, 4.27 in. 27th and 28th, Fayetteville, N. C., 6.25 in.; Pilot Point, Tex., 3.00 inches in 45 minutes.

*Largest Monthly Rain-falls*.—Ft. Barrancas, Fla., 14.28 inches; Fayetteville, N. C., 12.75; Pikes Peak, 12.15; Corsicana, 11.50; Shreveport, 10.23; St. Marks, 9.73; New Orleans, 9.17; Okalooska, La., 8.86; Savannah, 8.69; Clarksville, Tex., 8.37; Quitman, Ga., 8.00; Alta, Cal., 7.73; Deadwood, Dak., 7.69; Fort Sill, Ind. Ty., 6.93; Mt. Washington, 6.79; Colfax, Cal., 6.56; Mobile, 6.42.

*Smallest Monthly Rain-falls*.—Indio, Mammoth Tank and Yuma, Cal., Burkes, Ariz., and Edinburg, Tex., none; Tucson, Ariz., and Albuquerque, N. M., 0.02 inches; Prescott, Ariz., and La Mesilla, N. M.

0.03 in.; Laredo, Tex., 0.04 in.; Phoenix and Camp Grant, Ariz., and El Paso, Tex., 0.07 in.; Camp Verde, Ariz., 0.10 in.; Camp Apache, Ariz., 0.12 in.; Wickenburg, Ariz., and Ft. Davis, Tex., 0.13 in.; Yuma, Ariz., 0.15 in.; Mojave, Cal., 0.22 in.; White Water, Cal., 0.30 in.; Florence, Ariz., 0.33 in.; Pembina, Dak., 0.34 in.; Tecoma, Nev., 0.35; Yankton, Dak., and Anaheim, Cal., 0.37 in.; Dodge City, Kan., 0.40 in.; La Crosse, Wis., 0.42 in.; Rio Grande, Tex., 0.43 in.; St. Paul, Minn., and S. Vallejo, Cal., 0.45 in.; Santa Fe, 0.48 in.; Kingston, Can., 0.51 in.; Marquette, Mich., 0.53 in.

*Hail.*—Red Bluff, Cal., 7th, 10th; Umatilla, Or., 13th; Winnemucca, Nev., 4th, 14th; Pioche, Nev., 4th; Boise City, Idaho, 19th; Virginia City, Mont., 29th, during 7 minutes hail fell to the depth of  $\frac{1}{2}$  inch, storm  $\frac{1}{2}$  mile wide and about ten miles long; Fort Garland, Col., 2nd, 12th, 14th, 22nd, 23rd; Fort Preble, Me., 25th; Ft. Independence, Mass., 10th; Ft. McPherson, Neb., 21st; Ft. Union, N. M., 14th, 15th, 16th, 22nd; Ft. Niagara, N. Y., 10th; West Point, N. Y., 18th; Ft. Concho, Tex., 8th; Ft. Douglass, Utah, 20th; Ft. Fred Steele, Wy. Ty., 8th, 14th, 20th; Thomasville, Ga., 15th; Mt. Sterling, Ill., 9th, two miles northwest of station hail fell to the depth of four inches; Highland, Ill., 9th, 14th; Great Bend, Kan., 30th, 8.20 a. m., very heavy hail storm, accompanied by a strong N. wind, unsheltered cattle stampeded, many small birds killed, much foliage cut from trees, young orchards badly damaged, and nearly all windows on north exposures were broken; Holton, Kan., 6th; Independence, Kan., 6th, 8th; Wellington, Kan., 21st; Okalooska, La., 14th, 15th; West Waterville, Me., 26th; New Market, Md., 15th; Emmitsburg, Md., 17th, 18th; Covington Co., Miss., 15th, very severe hail storm, stones as large as goose eggs, shingles on houses split to pieces, fowls killed, gardens and orchards ruined; Oregon, Mo., 6th, 9th; Springfield, Mo., 29th; Kansas City, Mo., 7th, 29th; Genoa, Neb., 8th; Freehold, N. J., 3rd, 7th, 18th; Vineland, N. J., 19th; Flushing, N. Y., 24th; Fallsington, Pa., 3rd, 9th, 20th; Cincinnati, 2nd; Ashwood, Tenn., 16th, 9 p. m., six miles south of station very severe hail storm, stones as large as hens' eggs, precipitation so heavy that they could be gathered up on the following morning, great damage done to cornfields, width of storm about three miles; Aiken, S. C., 15th, 17th; Ft. Gibson, Ind. Ty., 6th; Leavenworth, 6th, 29th; Denison, Tex., 15th; San Antonio, Tex., 15th, 22nd; Graham, Tex., 30th; Uvalde, Tex., 23rd; Concho, Tex., 8th; St. Marks, Fla., 15th; Corsicana, Tex., 15th, very severe hail storm, stones  $3\frac{1}{2}$  inches in circumference, much damage to gardens and windows, birds killed; St. Louis, 14th, violent hail storm, stones size of hens' eggs, much damage to windows, total damage in vicinity \$10,000; Logansport, Ind., 25th; Memphis, Tenn., 14th; Albany, N. Y., 15th; New London, Conn., 17th; Shreveport, 15th, 6.45 p. m., severe hail storm, stones size of turkeys' eggs, corn and cotton very much damaged, width of track 7 miles, length 18; Arlington, Tex., 16th, stones of unusual size, some weighing five ounces; Ennis, Tex., 4.30 p. m., terrific hail storm, some stones  $5\frac{1}{2}$  inches in circumference, fruit crop badly damaged; Terrell, Tex., 16th, terrific hail storm, stones size of goose eggs; Leesville, Cantwell Co., Tex., 16th, stones as large as hens' eggs, breaking windows and destroying crops; Navasota, Grimes Co., Tex., 14th, considerable damage to corn and cotton; New Orleans, 16th, 5.30 to 7.30 p. m., heavy thunder and hail storm from the west, hail stones one to five inches in circumference, rainfall 2.82 inches, doing much damage to glass and crops, "during the storm a duck, of a species known as the 'blue rail', rarely seen in this city, though occasionally met with in the marshes along the Gulf stream, more than 100 miles south here, fell to the pavement dead, having its back and wings covered with a thick coating of ice."

*Rainy Days.*—The number of days during which rain or snow has fallen varies as follows: New England, from 12 to 17; Middle Atlantic States, 7 to 17; South Atlantic States, 8 to 15; Key West, 1; Gulf States, excepting Texas, 8 to 11; Texas, 2 to 13; Ohio valley and Tennessee, 9 to 16; Lower Lake region, 12 to 19; Upper Lake region, 6 to 11; Upper Mississippi valley, 7 to 10; Missouri valley, 5 to 13; Red River of the North, 5 to 7; Eastern Rocky Mountain Slope, 5 to 8; Rocky Mountains, 1 to 16, and on Pike's Peak, 20; Western Plateau, 9 in Idaho to 11 in Nevada and Utah, to 1 and 0 in southern Arizona; California, 6 to 12; coast of Oregon and Washington Ty., 18.

*Cloudy Days.*—The number varies from 8 to 18; Middle Atlantic States, 9 to 14; South Atlantic States, 5 to 9; Gulf States, 1 to 10; Lower Lakes, 8 to 15; Upper Lakes, 4 to 10; Ohio valley and Tennessee, 5 to 10; Upper Mississippi valley, 2 to 9; Lower Missouri valley, 7 to 11; Eastern Slope, 0 to 9; Rocky Mountains, 0 in southern New Mexico to 15; Western Plateau, 7 to 12, to 0 in southern Arizona; Pacific coast, 5 in southern to 17 in northern portion.

*Snow fell in the different districts as follows:* New England, 1st to 7th, 9th to 19th, 25th, 27th, 28th, 29th; Middle Atlantic States, 1st to 7th, 11th, 12th, 13th, 15th, 17th, 18th, 19th, 25th, 27th, 30th; South Atlantic States, Lenoir, N. C., 19th, on mountains; Ohio valley, 2nd, 3rd, 4th, 5th; Lower Lakes, 1st to 5th, 10th, 11th, 13th, 15th; Upper Lakes, 1st, 2nd, 3rd, 4th, 5th; Upper Mississippi valley, 1st, 2nd, 3rd, 28th, 29th; Dakota, 2nd, 8th, 9th, 16th, 23rd; Rocky Mountains, 1st, 3rd, 5th, 6th, 8th, 9th, 12th, 13th, 14th, 15th, 16th, 20th, 21st, 22nd, 23rd, 28th, 29th, 30th; Nevada, 2nd, 4th, 5th, 7th, 8th, 11th, 12th, 20th, 21st; Utah, 8th, 20th, 21st; California, Yreka, 14th at station, 10th, 19th, low down on the foot hills; Los Angeles, 5th, 11th, tops of mountains covered with snow; British Columbia, New Westminster, 16th. The largest total monthly snowfalls at stations in the Sierra Nevadas are reported by the observers of the C. P. Railroad Co. as follows: Emigrant Gap, 28.00 inches; Cisco, 45.00 inches, and Summit, 45.25 inches.

*Depth of Snow on Ground at end of Month.*—Pike's Peak, 72 inches; Mt. Washington, 6 in.; Mt. Desert, Me., about one foot in the woods; Rowe, Mass., 6 to 12 inches in the woods; Dunbarton, N. H., in drifts; Woodstock, Vt., in drifts; Red Bluff, Cal., snow on coast range.

**Droughts.**—Dallas, Tex., 19th, most severe that has been experienced in this section for 30 years; on many plantations wheat is not more than one foot high and is heading out; fears are entertained of a famine in corn and oats; so far vegetables are a total failure; "the high and dry winds that have prevailed for three weeks are still blowing, with no moisture in the air and not a cloud to be seen in the heavens;" the drought covers all that portion of the state lying upon a line of Denison and San Antonio, including every county west of it, and an average of two tiers east; in some portions of this territory people are hauling water for drinking purposes a distance of from three to six miles; the larger streams are all of them lower than can be remembered. Fort Gibson, Ind. Ty., 21st, vegetation greatly retarded, stock excepting sheep suffering very much. Ft. Dodge, Ia., 30th, vegetation very backward for want of rain. Corsicana, Tex., 2nd, small grain suffering; 14th, much damage has resulted to the grain crops. Indianola, Tex., 8th, crops suffering very badly; very little rain has fallen in the past three months. Grand Haven, Mich., 24th, crops suffering considerably for want of rain. Yankton, Dak., 30th, wheat suffering. Kanab, Utah, 2nd, ground and grass suffering very severely, cattle dying on ranges; 8th, grass withering; 14th, cattle still dying; 30th, no rain, everything drying up.

**Floods.**—Forsyth, Ga., 17th, heavy rain, doing great damage to cultivated fields by washing. Thomasville, Ga., 15th to 17th, much damage to farms, highways and railroads, trains stopped four days by wash-outs. Fayetteville, N. C., 28th, very heavy rain-storm, caused the breaking away of a dam outside city limits, one railroad and three street bridges swept away, and a large woolen factory almost entirely ruined; much damage to private property. Deadwood, Dak., 21st, 22d, several houses washed away. Omaha, Feb., 8th, 9th, railroad tracks along the flats submerged; smelting and refining works partly flooded. Fort Sill, Ind. Ty., 22nd, creeks impassable. Corsicana, Tex., 22nd, all highway bridges within a radius of thirty miles swept away; large numbers of cattle and horses drowned; railroad trains abandoned on the Texas Central for thirty-six hours. Shreveport, La., 15th, houses flooded.

For *March* the following total monthly rainfalls were received after the issue of the REVIEW: Dakota—10 in. at Fort Totten; 25, Fort Buford. Montana—.14, Fort Benton; .19, Fort Keogh; 1.85, Blackfeet agency; 1.86, Fort Logan; 2.77, Fort Ellis. Idaho—2.12 at Fort Lapwai. Washington Territory—1.24 at Fort Colville; 2.10, Fort Townsend; 13.70, Bainbridge I.; 23.83, Neah Bay. California—.07 at San Buenaventura; .55, San Geronio; .60, Campo; 19.28, Camp Gaston. Arizona—.00 at Fort Mojave; trace at Camps Apache and Verde; .05, Prescott; .18, Camp Lowell; .40, Camp Bowie; .48, Yuma; .60, Camp McDowell; .85, Camp Grant. New Mexico—.32 at Silver City.

## RELATIVE HUMIDITY.

The average percentage of relative humidity for the month ranges as follows: New England, from 58 to 71; Middle Atlantic States, 50 to 76; South Atlantic States, 55 to 75; Key West, 68; Gulf States, 54 to 74; Ohio valley and Tennessee, 50 to 62; Lower Lake region, 59 to 71; Upper Lake region, 59 to 69; Upper Mississippi valley, 47 to 56; Lower Missouri valley, 52 to 59; Red River of the North valley, 59 to 75; Eastern Rocky Mountain Slope, 45 to 54; Rocky Mountains, 35 to 58; Western Plateau, 35 to 52; Pacific States, 35 to 76. *High stations* report the following not corrected for altitude: Mt. Washington, 86; Pike's Peak, 60 per cent.

## WINDS.

The prevailing winds at the Signal Corps stations are shown by the arrows, flying with the wind, on chart No. II. The *maximum* velocities, in miles per hour, have been given in the description of the movements of areas of low and high pressure. On Mt. Washington the highest velocity of the month, NW. 182 miles, was recorded on the 1st.

**Total Movements of the Air.**—The following are the *largest* monthly movements recorded at the Signal Corps stations, viz.: Pike's Peak, 14,958 miles; Cape May, 13,591; North Platte, 12,994; Thatcher's Island, 11,512; Dodge City, 11,421; Cape Lookout, 11,346; Sandy Hook, 11,221; Breckenridge, 10,788; Wood's Holl, 10,662; Kittyhawk, 10,488; Ft. Sill, 10,369; Indianola, 10,309; Barnegat, 9,959; Ft. Stevenson, 9,563; Boston, 9,466; Cape Henry, 9,281; Cape Hatteras, 9,090. On the summit of Mt. Washington a continuous record has not been obtained. The *smallest* are La Mesilla, N. M., 1,234 miles; Visalia, Cal., 2,491; Roseburg, Or., 2,501; Nashville, 2,605; Deadwood, 3,035; Tucson, 3,050; Augusta, 3,124; Lynchburg, 3,279; Virginia City, 3,395; Olympia, W. Ty., 3,432; Uvalde, Tex., 3,454; San Antonio, Tex., 3,751; Graham, Tex., 3,785; Los Angeles, 3,823.

**Local Storms.**—As low pressure area No. IV passed eastward over Virginia on the 3rd, a "tornado occurred at Brown's Summit, N. C., doing a large amount of damage." As low pressure area No. VIII moved eastward over the central Mississippi valley, during the afternoon and evening of the 14th, tornadoes occurred at Collinsville, Madison Co., Ill., and at Pocahontas, Hardman Co., Tenn. Prof. Nipher, in the monthly bulletin of the Missouri Weather Service, states that "in the Mississippi bottom, a few miles east of St. Louis, several tornadoes, unaccompanied by lightning, rain or hail, were developed, (at least four,) the tracks of three of which intersected in the village of Collinsville, Ill.," and that "a careful study of these has been made, and the results will be published in detail." The one at Collinsville "passed through the town at 2:45 p. m., taking a zigzag course in a general direction from WNW. to ESE.—width of path about 1,200 feet and length about three-quarters of a mile—the storm lasted about two or three minutes, destroyed about sixty buildings and injured several persons; in the cemetery nearly every stone was leveled; total